

Module I: Environmental Health of the Mississippi Delta

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Competency Statement

The learner will obtain an overview of the ecology and special characteristics of the Mississippi Delta Region (MDR). Further, the learner will be able to describe the geography, topography, climate, natural resources, industries, demography, culture, and health profiles of the residents of the Delta, especially as they relate to environmental issues. This module supports the development of the General Environmental Health Competencies for Nurses for “Basic Knowledge and Concepts” as outlined in the Institute of Medicine (IOM) report on Nursing and Environmental Health (Pope et al., 1995).

Rationale

Season, geography, topography, weather, and environmental contaminants all affect residents of the MDR. These factors influence the environmental health of the region. Socioeconomic and cultural factors have bearing on the life style choices of residents, sometimes increasing their risk of exposures and tempering responses to environmental exposure risks. Knowledge about these factors is essential to increasing the sensitivity and enhancing the interventions of nurses as they respond to actual and potential environmental health needs of communities.

Objectives

Upon completion of this module, the learner will be able to:

1. Define environmental health.
2. Identify the various regions and resources of the Mississippi Delta.
3. Describe the socioeconomic and cultural characteristics of the residents of the MDR.
4. Identify health issues in the MDR.
5. Describe environmental health risks specific to the MDR.

Vocabulary

Acute toxicity
Agency for Toxic Substance and
Disease Registry (ATSDR)
Aquaculture
Carcinogenicity
Chronic toxicity
Comprehensive Environmental
Response, Compensation, and Liability
Act (CERCLA)
Developmental toxicity
Environmental effects
Environmental health
Environmental Protection Agency
(EPA)
Exposure pathway
Lower Mississippi Delta Development
Commission (LMDC)
Mississippi Delta Region (MDR)
Neurotoxicity
Off-site transfers
On-site releases
Priority health conditions

Standard Industrial Classification
Codes (SIC)
Superfund sites
Toxic Release Inventory (TRI)

Content

1.1 Define environmental health.

Health may be defined as wholeness and well being for an individual, family, or community. Physical, social, economic, cultural, and political aspects of the environment influence health. Swanson and Niles (1997) name nine areas of environmental concern that seriously affect well being: living problems, work hazards, atmospheric quality, water quality, housing, food quality, waste control, radiation, and violence. These areas vary by degree of positive and negative influence on health by nature of the factor, scope, and intensity of impact. The client's ability to utilize and manage environmental resources or challenges is also of great importance for protecting and promoting health. When environmental resources become unsafe or contaminated to the point that the health of a community or individual is jeopardized, then those resources are considered hazardous. In an IOM report, environmental health is defined as freedom from illness or injury related to exposure to toxic agents and other environmental conditions that are potentially detrimental to human health (Pope et al., 1995).

Assessment of environmental health for an individual and community involves investigation of human exposures, responses, and links between a hazardous exposure and the client.

Exposure to hazardous wastes and other toxins is associated with socioeconomic and cultural factors for some communities and groups. For example, risks may result from particular work activities and settings, from housing and neighborhood locations, and from life style choices and behaviors. One's ability to choose safe work activities and housing may be directed by education, ability to afford housing, and travel costs. Adverse socioeconomic results may occur for a family when individuals exposed to toxins become ill and disabled, thereby losing work and associated wages. One's land and home value may depreciate after pollution from a nearby plant is recognized, or housing near such a plant may be the most affordable to those of limited income. These examples represent a few of the connections between socioeconomic factors and exposure risks; the factors may contribute to increased hazardous exposures and they may result from such exposures. An investigation of such variables as employment opportunities, location in distance from an industry that emits toxic wastes, or food intake patterns are included in an exposure history. (See Module IV for details on taking an individual exposure history.)

Socioeconomic and cultural factors also influence perceptions about health and risk-taking. They affect individual and community decisions about preventing environmental threats and about when and if to take action when toxic exposures occur. Understanding social, economic, and cultural distinctions increases the nurse's sensitivity to community needs and facilitates partnership work for addressing environmental problems. (Module VI describes how to work in partnership with community residents.)

The history of social and economic exchanges within a locality also shapes the residents' interpretation of hazardous exposure, views about rights to environmental health, and decision to seek help for working toward solutions. Views on how persons interact in the community are rooted in history and become part of the cultural beliefs. History also reveals whether poor or particular ethnic groups have been oppressed. From study of an area's socioeconomic history, the health care worker may recognize when social and economic inequity contribute to the siting of hazardous waste facilities. Recognition of environmental inequity may motivate residents and nurses to address locality concerns with appropriate vigor. Cultural and socioeconomic variables of the MDR are introduced in this module and described in detail in Module II.

Assessment of a community's environmental health includes consideration of cultural and socioeconomic variables for that community. Interventions described in Modules IV, V, and VI are based on consideration of environmental health as a holistic concept.

1.2 Describe exposure pathways.

An exposure pathway is the process by which an individual is exposed to contaminants that originate from some source of contamination. Identifying and evaluating exposure pathways is done by assessors with special training in this area; the nurse may locate such public health experts through local and state health departments or federal agencies. Nurses need a beginning knowledge of exposure pathways. There are five elements that are assessed in determining if an environmental exposure pathway exists (ATSDR, 1993b). The

elements are:

- # **Source of contamination.** The point of release in to the environment or environmental media responsible for causing contamination at a point of exposure if the original source of contamination is unknown. Examples include landfills, emission stacks, incinerators, pipes, and storage drums. Specific information to be obtained includes location or release point, storage and disposal history, nature of contaminants, emission rates, release frequencies, operating periods, and current status.
- # **Environmental media and transport mechanism.** Media includes wastes, groundwater, surface water, air, surface soil, subsurface soil, sediment, and biota. Transport mechanisms move contaminants from the originating source to a point where human exposure can occur.
- # **Point of exposure.** The location of potential or actual human contact with a contaminated medium such as a residence, business, playground, campground, water source, food service, sludge from municipal waste treatment processes, and contaminated building material.
- # **Route of exposure.** The means by which the contaminant actually enters or contacts the body. Examples include routes such as ingestion of contaminated food or water; inhalation of contaminants via steams, aerosols and air; dermal and food contact; and dermal absorption of contaminants in water, soil, air, food, and other media.

Receptor population. Persons who are exposed or potentially exposed to the contaminants of concern at a point of exposure.

A completed exposure pathway occurs when all five elements link a contaminated source to a receptor population. When data shows several elements but one or more is missing a “potential” exposure pathway exists. See Figure 1 for an illustration of exposure pathways. Additional illustrations of exposure pathways can be found in ATSDR’s Public Health Assessment Guidance Manual (1993). Exposure pathway assessment is used as a critical tool in response to a community’s health concerns about environmental contamination. An accurate assessment facilitates an appropriate response (ATSDR, 1993b).

2.1 Define the MDR

Definition of the MDR comes from the Lower Mississippi Delta Development Commission (LMDC), a body established under Public Law 100-460 in 1988 through legislation introduced by senators and representatives from the seven Lower Mississippi Delta Region states. The commission was charged to study and make recommendations regarding economic issues in the region and to develop a 10-year regional economic plan. In the 1990 final report, the MDR is specified as a 219-county strip along the Mississippi River in Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee. See Appendix A for a listing of counties that constitute the MDR. This seven-state composite of the MDR covers 76.7 million acres of fertile soil and wetlands. The MDR begins in the southern portion of Illinois and ends at the southeastern tip of Louisiana where the Mississippi River empties into the

Gulf of Mexico.

2.2 Describe the natural resources of the MDR

The MDR is a region of great forests, swamps, rivers, and islands. Land along the Mississippi River has benefitted from centuries of sediment deposits. During years that the river is confined to its normal channel, these deposits benefit the true delta at its mouth; in years of unpredictable flooding, these rich deposits benefit surrounding land all along the river. The natural and recurrent cycle of flooding in the Delta has resulted in rich, incredibly fertile soil. Blessed with a lengthy growing season, torrential rains, and a temperate-to-hot climate, the Delta supports a startlingly rapid growth of vegetation (Cobb, 1992). The Delta is not subjected to prolonged extreme temperatures; the humidity averages 70% and annual rainfalls average 49 inches (Worldmark, 1995).

Fertile soil, a favorable climate, and a long growing season contributed to the region's agricultural success in producing cotton, soybeans, rice, sugarcane, corn, tobacco, wheat, and grain sorghum. Since 1980, alternative crop production has been encouraged as a means for small- and medium-sized farms to expand and diversify farm production. For example, ethanol, which can be developed from crops such as corn, wheat, grain, sorghum, and sugar cane, is manufactured as a fuel alternative for petroleum (LMDC, 1989). Agriculture has been the economic cornerstone of the MDR. Technological changes in planting and harvesting have lessened labor requirements, resulting in a high number of displaced workers. Many small farms suffer from a shortage of

capital and still operate outdated equipment, putting them at a disadvantage in market competition (LMDC, 1990).

The Mississippi River and its tributaries have provided a vital means of transportation for interfacing the global commercial market and facilitating tourism and recreation. The emergence of river showboats and casinos has provided a substantial increase in revenues for cities and towns located on the banks of the Mississippi River. Water is abundant throughout the MDR from rainfall and from surface waters, providing an almost limitless supply for industrial uses. However, flooding causes millions of dollars of damage annually; drainage and flooding problems are barriers to economic growth in some counties and parishes. Only 50% of flood-control works planned for the Delta have been completed (LMDC, 1990).

Even though water is plentiful, many small communities and rural households do not have access to an approved public water supply because development of water sources, treatment facilities, and distribution lines are costly for poor and rural areas (LMDC, 1990).

Expansive miles of freshwater wetlands found within the two extreme southern states of the MDR, Louisiana and Mississippi, have contributed to successful catfish, crawfish (crayfish), and bait fish industries. The seafood industry is also referred to as the region's aquaculture. The coastal marshlands and wetlands serve as protected habitats for wildlife; they are a popular site for recreational fishing and a lucrative site for harvesting commercial seafood.

The vast acreage of forest within the MDR covers 45% (34.6 million acres) of the land. Timber is used for furniture, paper, and pulp mills. Typical trees found in the region include hardwoods such as white and red oak, hickory, maple, and beech; and softwood such as long leaf and slash pine, and red cedar (Worldmark, 1995).

Mineral deposits found in the MDR include petroleum, coal, sand, clay, gypsum, stone, gravel, sulfur, lime, zinc, lead, bromine, and fluorspar (Worldmark, 1995). The production of minerals is a central element in the economy of several states. Arkansas produces bromine, cement rock, and limestone (Arkansas State Profile, 1997); Kentucky produces limestone, clay, sand, and gravel (Kentucky Atlas and Gazetteer, 1997); and Louisiana produces and refines oil and natural gas (Louisiana Dept. of Economic Development, 1994).

Products manufactured in the MDR include food and kindred products; tobacco; textiles; lumber and wood products; furniture and fixtures; paper and allied products; rubber and plastic products; chemical products; petroleum refining; metal and fabricated metal products; and stone, clay, glass, and concrete products (Worldmark, 1995).

Economic activities in the MDR are based in part on the geographic and resource capability of the region. The nature of economic activities is determined also by community history, cultural practices, and social interaction patterns.

Learning Activity

Describe the resources (e.g. agriculture, fishing,

mining, recreation etc.) that contribute to your state's economy. Tell how contamination of each of these resources would impact the environmental health of the region.

++Contact your local or state Health Department to obtain a list of the hazardous waste sites they have worked on in the last five years. Make a list of the known contaminated sites for your state and describe what resources were impacted and how they affected the local economy.

3.1 Describe the human resources of the MDR

More than 8.3 million people inhabit the MDR. One third live in five major cities (Memphis, TN; New Orleans, LA; Little Rock, AR; Jackson, MS; and Baton Rouge, LA.). The region is more rural and less densely populated than the United States as a whole. In 1989, the MDR had a higher percentage of African-Americans (20.3%) than the United States as a whole (12%), but a smaller percentage (1.7%) of other ethnic groups (Native-Americans, Asians/Pacific Islanders, Hispanics) than the rest of the nation. (4.2%) (Nathan et al., 1997).

3.2 Describe the socioeconomic characteristics of residents of the MDR

The MDR is a region that has not reached its full potential for economic development. In early reports such as *The Body of the Nation* (LMDC, 1989), the region is described as a land of hardship and poverty; the poorest region of the United States. In 1993, the percentage of persons below the poverty level for all ethnic groups in the MDR (24.5%) was

higher than the rest of the U.S. (15.1%). Similarly, family median income, employment, and educational attainment are lower than U.S. levels (Nathan et al., 1997b). Table 1 shows groups below poverty level for MDR counties and other U.S. counties in 1989. In MDR counties, more children younger than age 18 are below the poverty level (30.55%) than in other U.S. counties (18.31%). For individuals older than 65 years of age, 28.09% are below the poverty level in MDR counties compared to 15.47% for other U.S. counties (Levine et al., 1997b).

Table 2 shows 1993 median household income for MDR counties (\$21,798) and U.S. counties as a whole (\$31,241); the percent poor in MDR counties is 24.465% compared to 15.1% for all U.S. counties (U.S. Census Bureau, 1993).

Median income for MDR counties decreased from 1989 (\$22,461) to 1993 (\$21,798) while U.S. median income increased from \$27,765 (1989) to \$31,241 (1993). The percentage of poor in MDR counties increased from 1989 (24.01%) to 1993 (24.465%). The percent poor for the U.S. in 1996 was 13.8%. Comparable 1996 figures for counties are unavailable (U.S. Census Bureau, 1996).

Table 3 shows that MDR whites and blacks are poorer than in other U.S. counties and that blacks are poorer than whites in Delta and other U.S. counties. In the MDR, blacks have the highest proportional representation among the poor and poverty for them as compared with whites is greater in the region than in other parts of the country. Persons of all ethnic groups older than 65 years of age have the highest poverty disadvantage in the

MDR compared with the rest of the United States.

Throughout the southern states there are concentrations of poor rural blacks, together with poor rural whites, who are at the bottom of the U.S. per-capita income distribution. In these pockets of poverty the groups suffer from everything from lack of indoor toilets to illiteracy to bad teeth. People who live in rural areas in the South are more and more confined to pockets

TABLE 1

Population, Families, Racial or Ethnic Groups, Children, and Elderly Below Poverty Level. Percent below poverty level for Delta and Non-Delta Counties, USA, 1989

Percent Below Poverty Level		
Population Groups	Delta	Other USA
Overall Population	24.01%	14.61%
Families	19.09%	11.06%
Whites	6.46%	12.71%
Blacks	47.45%	29.37%
American Indian, Eskimo, and Aleut	30.92%	22.91%
Asians and Pacific Islanders	9.53%	8.32%
Hispanics	26.29%	23.27%
Children under 18	30.55%	18.31%
Over 65	28.09%	15.47%

Source: Nelson-Knuckles et al. (1997). Mississippi Delta Project: Health and Environment

TABLE 2

Median Household Income and % Poor for MDR Counties and U.S. Counties

Income Dimensions	Delta Counties	All U.S. Counties
Median Household Income	\$21,798	\$31,241
% Poor	24.465%	15.1%

Source: U.S. Census Bureau (1993) County Income and Poverty Estimates**TABLE 3**

Income by Race Median Per Counties. Delta and Non-Delta Counties, U.S., 1989

Income Type per Race	Delta Counties	Other USA Counties
Per Capita Income: Whites	\$10,412.00	\$11,429.00
Per Capita Income: Blacks	\$ 4,866.50	\$ 6,438.00
Median Household Income: Whites	\$21,012.00	\$24,327.00
Median Household Income: Blacks	\$10,584.00	\$14,583.00

Source: Nelson-Knuckles et al. (1997). Mississippi Delta Project: Health and Environment

of poverty within the region (Reed, 1993).

Table 3 shows that in MDR counties, median household income for blacks is less than half the median household income for whites.

The LMDC (1990) reported the Delta region to have one of the highest illiteracy rates in the nation, with only 54% of the adult population completing high school. For the same time period high-school dropout rate was high for the MDR states, ranging

from 10.6% (Illinois) to 13.4% (Tennessee) (Knuckles et al., 1997). A report of high-school dropouts for 1993–94 for some MDR states showed a decline in dropouts. While this more current data is based on incomplete reporting (some states did not report rates), the MDR states who did report show a substantial decline in high-school dropouts between the two time periods reported, as is shown in Table 4. For 1993–94, the median national high-school

TABLE 4

High-school dropout rates in 1990 and 1993-94 for four MDR states

State	1990	1993-94
Arkansas	11.4%	5.3%
Louisiana	12.5%	4.7%
Mississippi	11.8%	6.1%
Missouri	11.4%	7.0%

Source for 1990 data: Knuckles et al., 1997

Source for 1993-94 data: US Dept. of Commerce, 1996

dropout rate was 5%. (U.S. Department of Commerce, 1996).

Problems with literacy and high school completion are likely related to poverty and teenage pregnancy. There are 104 institutions of higher learning in the MDR (LMDC, 1990) and within the Lower Delta Region, 30 are historically Black Colleges and Universities (HBCU's). Unfortunately many in the MDR can't take advantage of higher education opportunities.

Other socioeconomic characteristics of the MDR residents include higher unemployment rates and disproportionately high numbers of families on some kind of public assistance. A reporting of state ranking according to the percentage of public aid recipients showed that Mississippi ranked second in the nation (10.9%), Louisiana ranked fourth (9.7%), and Kentucky ranked sixth (9.3%). The four remaining MDR states also ranked high for the percentage of the population receiving public assistance (Knuckles et al., 1997). In 1996, MDR counties averaged an 8.18% unemployment rate compared to a nationwide

5.5% average unemployment rate (Bureau of Labor Statistics, 1997).

Poverty is a key concern for groups in the Mississippi Delta. The congressional study report by the LMDC (1990) presented the following statement to the United States Congress Subcommittee on Economic Development.

The MDR is the:

poorest region of the United States of America; where jobs are scarce and jobs skills training almost unknown; where infant mortality rates rival those in the Third World; where dropping out of school and teenage pregnancy are commonplace; where capital for small farmers and small businesses is severely limited; where housing and health care are unattainable for many; where industrial technology lags a decade behind and funds for research and development barely trickle to colleges and universities; and where literacy reigns as a supreme piece of irony. The region has produced some of the best

writers and worst readers in America (LMDC, 1990, p.6).

The children of the MDR, the most vital resource for the region, are those at greatest risk for limited achievement yet they are the hope for the future. Strategic interventions must be implemented to access resources and develop them. The future marketplace will depend on technology, accessible service sectors, and a knowledgeable and skilled work force. Without appropriate knowledge and skills, the children of the MDR will not be productive and competent in the changing society; they will not be able to participate in the work force as mandated by future role requirements (LMDC, 1990). Protection of children from toxic exposure is of great importance; they are a vital resource. Children are impacted by toxic exposures differently than adults. Modules III and IV describe these differences.

Among Delta families and communities wealth coexists with extremes of poverty in adjacent communities. Cobb (1992) suggests that the outlandish human and material differences found in the Delta were shaped by pervasive global and national economic influences and federal policies that often confirmed the region's inequities and reinforced its social and political order. He adds, "local affluent people live in the incredible fiction that they do not have poverty all around them" and socio-economic disparity has become an increasingly prominent feature of American life.

The LMDC report described such social and economic problems of the Delta in detail, yet opportunities for change were noted. In the

final report, the Delta's own people call for a need to face environmental problems along with economic development. Growth and economic development cannot occur with disregard to environmental protection. This means that in the future, protecting the Delta's environment will pay off by attracting more new business, tourism dollars, research grants, and job opportunities (LMDC, 1989). Unless we monitor for harmful effects, these new opportunities may increase risks from environmental pollution. Module VI explains how nurses can work with community residents to take responsibility for such prevention of harm.

Learning Activity

Search the Internet, your local library resources, or county and state summaries for data about the population of your community. Look for median family income, age distribution, education attainment, and ethnicity for your area or region. For the most current, year compare local area population characteristics with the same ones for the national population.

3.3 Describe the cultural characteristics of the residents of the Mississippi Delta Region

The territory reaching from southern Illinois to the southeastern tip of Louisiana is populated by a mixture of ethnic and racial groups. A variety of African and European cultures converged throughout the south and modified one another in distinct ways (Joyner, 1996). The MDR has a higher percentage of black Americans than the U.S. as a whole. Immigrants from the British Isles settled in Arkansas, immigrants from Germany in Missouri, and Scotch-Irish settlers located in Kentucky and Tennessee. American

Indians contributed to the mix in Kentucky and Tennessee. Hispanic settlers are represented among the people of Illinois (Worldmark, 1995). In Louisiana, the blacks were descendants of “free people of color.” Some were craftsmen and rural property owners before the Civil War. The ethnic mixing in Louisiana produced the Creole language out of a convergence of French with various African languages (Joyner, 1996). A group referred to as “colored” Creoles constituted a black elite in urban and rural Louisiana (LMDC, 1989).

The people of the Delta made rich cultural contributions to the U.S. providing numerous musicians and writers of the finest caliber. Robert Sacre’s study of Mississippi Delta blues (cited by Prevos et al., 1989) relates that the blues started in Mississippi with musicians such as Charley Patton who influenced artists such as Muddy Waters and Howlin’ Wolf. The MDR was a site of intense music composing, performing, collecting, and recording. It was the source of the migratory movement of blues to northern cities. In Memphis, the blues took on its own life through pianists and popular music composers, including W.C. Handy and B.B. King. In Louisiana, music ranged from Cajun and Cajun-inspired to traditional acoustic blues, more modern forms of swamp blues, and New Orleans jazz (Prevos et al., 1989). New Orleans is the birthplace of jazz musician Louis “Satchmo” Armstrong and the great gospel singer, Mahalia Jackson. Kentucky, Tennessee, and Arkansas are the seedbed of American folk and country music (Reed, 1993). Music from black and white cultures intersected and modified musical forms. This separating and mixing of ethnic styles produced exciting musical traditions in New Orleans and throughout the Delta. Elvis

Presley of Tupelo, Mississippi, was a performer who personified the mix of black and white musical traditions (Joyner, 1996).

The Delta has produced great writers whose literature has profoundly influenced the country including William Faulkner, Thomas Wolfe, Flannery O’Connor, Eudora Welty, and Richard Wright. The struggle to reconcile the Delta’s contrasts and unravel its contradictions provides the central dynamic for a rich literary tradition. Cobb (1992) states that writers discovered in the Delta story the opportunity to pursue themes more universal than unique. William Faulkner, for example, used the Delta to explore questions of greed, cruelty, and the ravages of man and modernity against nature. Similarly Tennessee Williams drew on the Delta to expose the materialism and depravity that may flourish behind the facade of wealth, status, and power in any society.

Several contemporary writers (Dunbar, 1990; Walton, 1996; Yates, 1990) critique life and politics in the Delta as viewed from personal experience and from interviews with Delta residents. Their writings provide a perspective on change and continuity of the Delta’s way of life.

Education has been a problem for many in the MDR because of their poverty and rural location. As noted earlier, fewer MDR people have achieved high school graduation than their counterparts in other parts of the nation. Following the desegregation of public schools in 1954, there was a growth of private, segregated schools that tended to preserve the separation of ethnic groups (Reed, 1993). Separation of ethnic groups is reflected somewhat in the university system. The black university system

has been the backbone of the black community, training its leaders and professionals, and providing a network through which accomplished individuals can locate one another and work together (Walton, 1996).

English is the predominate language spoken in the MDR. The area is known for its south midland speech. Other languages spoken include Spanish, Korean, German, Chinese, French, Japanese, Italian, Vietnamese, Cajun (from Nova Scotia origins), and Creole (from French origin).

Residents of the MDR state that traditional foods of the region include fried chicken, greens and cornbread, homemade ice cream, barbeque, and peach and apple pies. Grits and bacon are common breakfast foods among the white residents, while grits and salt pork with molasses are typical among the blacks. Blacks are known for their soul food—neck bones, mustard greens, ham hocks, candied yams, and buttermilk—which are rich in calories and high in cholesterol. Creoles are known for their spicy New Orleans food such as red beans and rice, seafood gumbo, and spicy fried fish. In the MDR, foods are home grown as well as purchased from the market. Some foods are still cooked in old iron pots and skillets. Traditional southern foods are prepared for family outings, homecomings, and funerals. (Information about traditional foods and food practices reported here are drawn from statements of residents in the MDR to the authors of Module I; the authors' life-long residence and work in the region confirm the reported observations regarding traditional foods, food preparation and the use of foods at social gatherings.)

The MDR is characterized by strong family ties. Families tend to be close, often living as an extended family in the same dwelling or in single-family dwellings on a common plot of land. In the MDR there are many female heads of household especially among black family units. These black females often teach their children strong morals and values related to child-rearing. This is the practice in other cultures as well. The church plays an important role in the MDR and may be the only social outlet available to some residents due to rural location and poor means of transportation. (Lincoln & Mamiya, 1990).

Health professionals should be sensitive to language styles and dietary patterns of groups in the MDR, as for any region which may differ from their own; outsiders may initially find local word choices quite varied from expressions in other regions of the country. It is best to listen and learn. Local residents in the MDR can provide rich detail about local expressions and dietary patterns and how these may differ from one community to another.

Environmental justice and avenues for nursing to address inequity between groups is addressed in Modules V and VI.

Learning Activity

In what way do the socioeconomic and cultural differences between the MDR and the U.S. populations influence environmental health needs? Describe language choices, life style customs, and patterns of social interaction in the area where you work that outsiders might find offensive. Are residents in the region aware that these cultural attributes are distinct for the locality?

++Collect environmental and general health education pamphlets from your local health department. How do they account for these language choices, literacy levels, and life style customs?

Describe life style practices that contribute to exposure to environmental hazards. Specify how these relate to exposure pathways.

4.0 Identify health issues for the MDR

Health needs for groups in the MDR are a result of varied factors including life-style; poverty; aging; and lack of health care that is accessible, acceptable, available, and affordable. Poverty often is associated with poorer health. In some cases, this is true for communities and groups in the MDR.

Most MDR states have higher rates of persons uninsured for health care than other states in the U.S. Causes for lack of insurance include poverty, the rural nature of the Delta economy, and the prevalence of low-paying and temporary employment opportunities. Often direct access to health care is a problem; there are 0.81 physicians per 1,000 people, less than half of the national average of 2.05 per 1,000 (LMDC, 1990). Even when primary health care is available it may be unacceptable because of distance or cultural factors.

Other data reported by Knuckles et al. (1998) show an underrepresentation of health care providers in the Delta compared with corresponding non-Delta areas. As is true for the rest of the nation, registered nurses represent the largest number of health care providers in the MDR. However, there are 34% fewer registered nurses in Delta versus

non-Delta areas. When compared to U.S. rates, the Delta has 9% fewer registered nurses while the non-Delta exceeds the national rates by 26%. Similarly there are 24% fewer primary care physicians and 33% fewer dentists in the Delta. Pharmacists, are also thought to be underrepresented.

Preventive health care lacks priority when individuals must focus on basic survival. Most often residents in the MDR who are below the poverty level, uninsured, or under- insured enter the health care system when chronic illnesses have caused life-threatening complications. At this point of entry, radical treatments, such as dialysis for kidney failure or amputation in the case of uncontrolled infection, may be required to save a life.

Three MDR states have high percentages of births to teenage mothers. Mississippi ranks first in the nation (21.7% of all births), Arkansas second (19.4%), and Louisiana third (18.7%), as quoted from U.S. National Center for Health Statistics, 1993 (Knuckles et al., 1997).

The infant mortality rate in some MDR counties exceeds the rates of Third World countries (Levine et al., 1997b). To describe infant mortality in the Mississippi Delta Region, Nelson-Knuckles et al. (1997) report 1990–1992 rates for three groups: (1) the rate for the 219 counties which define the Mississippi Delta Region, (2) the rate by the seven states where MDR counties are located, and (3) the rate for all other U.S. counties.

The MDR infant mortality rate for 1990–1992 was 13.7 deaths per 1,000 births among African American residents, in contrast to 8.0 deaths per 1,000 births among whites. The MDR

African American rate was also greater than the rate for African Americans (13.6 deaths per 1,000 live births) and whites (8.4 deaths per 1,000) living in the seven states which have counties represented in the MDR. Infant mortality rates for both African Americans and whites in the MDR were much greater than comparable rates in the 43 states outside the Mississippi Delta Region. Infant mortality rates in the 43 states were 13.1 deaths per 1,000 live births for African American and 7.6 deaths per 1,000 live births for whites (Nelson-Knuckles et al., 1997). These data suggest the need for effective programs to reduce the significant discrepancy in infant mortality experienced in the MDR.

The age-adjusted mortality rates for all causes and races indicate that the rate of death for persons who live in Delta counties is about 10 to 15% higher than the rate for persons who live in non-Delta counties within the Delta states and in the non-Delta states. The data shows that mortality rates for African American males appear to be higher in non-Delta counties in Delta states than in Delta counties. For white males, the highest rates occur in Delta counties, and the differences in rates between black and white males are greatest in non-Delta counties. However, the age-adjusted mortality rates for black males are greater than 50% higher than those for white males in comparable areas (Nelson-Knuckles et al., 1997).

The leading causes of death for black males in the Delta counties, the non-Delta counties in Delta states, and non-Delta states were fairly consistent, with the major causes being heart disease, cancer, homicides, and accidents. The leading causes of death for white males were also constant in the three geographical areas.

These were heart disease, cancer, and accidents. The age-adjusted mortality rates for all causes of death for females, black and white, were roughly the same in all geographic areas. The leading causes of death for black and white females were due to heart disease, cancer, and accidents. However, the all-causes age-adjusted mortality rates for black females were approximately 40% higher than those for comparable white females (Nelson-Knuckles et al., 1997).

The major causes of premature death among black males in all areas were homicide and accidents. For white males, the two major causes of premature deaths were heart disease and cancer. Among all females both white and black, the leading contributors to early deaths were cancer and heart disease. Overall mortality rates due to cancer were approximately 11% higher in Delta counties when compared with non-Delta states, and about 5% higher than in non-Delta counties in Delta states. For black males, Delta and non-Delta cancer mortality rates were roughly equivalent; for white males, Delta county cancer mortality rates were about 6% higher than non-Delta counties in Delta states. For black and white males, Delta county cancer rates were respectively 9% and 12% higher than in non-Delta states, thus the black/white cancer mortality rates for males were lower in the Delta counties than the non-Delta counties and the non-Delta states. Cancer mortality rates for white females were roughly comparable across all three areas. Rates for black females were highest in non-Delta counties (approximately 5% greater than in Delta counties and non-Delta states). Black/white mortality rates indicate that female rates were slightly lower in the Delta Region than in the non-Delta but higher than in

the non-Delta states (about 8%) (Nelson-Knuckles et al., 1997).

The health data in this profile is preliminary and descriptive. Nonetheless, we believe that the data constitutes a wake-up call for practitioners of traditional public health. Residents of the MDR, whether they are female or male, old or young, black or white, generally appear to have a greater risk of death than residents of other areas in the United States. In addition, African American residents are twice as likely to die prematurely than their white counterparts.

Whether this is attributable to characteristics of the place and/or conditions and life-styles of the people who live in the MDR needs to be the subject of further analysis. The disturbing point is that places within the southern United States have persistently been shown to have adverse experiences relative to the rest of the country when the health of their residents is surveyed.

Cardiovascular disorders, hypertension, diabetes, and cancer are diseases often affected by life-style. Cancer of the breast, cervix, lung, colon, pancreas, and prostate are seen in high numbers and may be related to environmental factors and dietary customs. Diets which are high in saturated fats and simple carbohydrates greatly influence the onset of symptoms of coronary artery disease and diabetes. The MDR agriculture and region-specific industries are possible sources of workplace exposure to environmental toxins. Farmers tend to have a higher incidence of prostate cancer.

Cancer of the lung with distant metastases is directly related to the high prevalence of smoking behaviors. Cancer of the cervix may be related to an inherited trait of black women to form uterine fibroids. Early detection and early intervention are recognized as the best

practices to prolong and enhance the quality of life.

Additional data is imperative to draw a comprehensive picture of the relationship between disease and risks to health in the Delta. This is especially the case with environmental diseases. However, the confounding factors already mentioned such as smoking, life-style behaviors and personal habits, occupations, and pre-disposition or preexisting disease can complicate determining relationships between environmental hazards and illness. Furthermore, environmental diseases may appear as common medical problems or have non-specific symptoms. Taking an environmental exposure history can, however, be instrumental in detecting and paving the way to intervening and appropriately treating environmental diseases, which may go

undetected until more severe complications arise (ATSDR, 1992). See Module IV on taking an environmental exposure history. In general, the areas for intervention for the issues of the MDR are as follows:

- Health education must be provided to the individual on how to prevent illnesses and injuries through healthier life-styles and behaviors. The materials should be tailored to the MDR giving consideration to language and culture.
- Primary health care must be available. For example, an individual should be able to visit a health care provider after working hours; farm work for example requires extended time throughout daylight hours.
- Health care must be affordable; poverty prevents seeking adequate health care. Communities must find ways to provide health care for the poor that is subsidized through grants or local organizational funding to ensure all can afford needed care. National policies and programs should address health care needs uncovered by local efforts.
- Health care must be accessible. In the outlying rural communities, for example, transportation to health care facilities must be available.
- Health care must be acceptable and culturally sensitive. Languages and health teaching approaches must be compatible with local cultural preferences.
- Early detection and monitoring should be available for cancer, diabetes, and cardiovascular diseases. Development and reporting

to state disease databases and registries.

- A comprehensive, user-friendly maternal and newborn care program should be established.
- Health care should be targeted to the increasing population of elderly residents who are left as the younger generations move to distant localities in search of work, education, or both.
- Environmental health resources must be available at the local and state level.

Learning Activity

Describe the diseases and health care problems for groups in the county or parish where you study or work. Is health care available, acceptable, and accessible for all residents?

Interview two or three residents to ask about their health problems and when and where they seek care. Offer information about accessible sources for care.

++Contact your state health department and determine what disease registries exist for your state (e.g., cancer, birth defects). How does the health department utilize the registries for planning health care? What are nurses roles in contributing to or maintaining the registries.

5.1 Describe the economic factors that are related to the MDR's environmental health

Key components of the MDR's economy are agriculture, aquaculture, and industrial manufacturing. Each of these can pose environmental hazards. Crops grown for food

and grain for livestock are at risk of contamination residue from pesticides and herbicides. This contamination affects not only the food products but also groundwater, and may run off into local waterways. Contamination of these waterways affects commercial fish and seafood products. (Mississippi Department of Environmental Quality, 1992).

Industries use natural resources in manufacturing and refinement, which contribute to environmental contamination of the air, land, and water. Manufacturing that utilizes chemicals can also carry environmental risks. Of course not all chemicals are toxic. Information on industries for a given locality and information on their management of chemicals and wastes is available on the Internet through a website maintained by the U.S. Environmental Protection Agency (EPA). Instructions for accessing the site are included in (Appendix B). Mapping of sites is also available at the EPA website through Governmental Information Services (GIS). Community residents and health care providers can use these Internet sites to search for a wide scope of environmental data such as watershed for bodies of water, schools, and population density. Local and state environmental organizations, present in some areas, can provide information too. A listing of environmental health resources is included in Appendix AA at the end of the curriculum. Appendix C for Module I shows EPA Guidelines for reporting toxic chemical releases.

Learning Activity

Plot cities, rural areas, population masses, industries, agriculture, and aquacultural areas

for your region on a map. What factors, including economic considerations contribute to environmental health risks there? Use the EPA website and the GIS material included or contact sources at local and regional libraries and organizations in your community that address environmental health.

5.2 Discuss the MDR State Toxic Release Profiles

Many federal agencies are given the responsibility for environmental health issues. Two of these agencies are the Agency for Toxic Substances and Disease Registry (ATSDR) and the EPA. ATSDR, an agency closely involved with hazardous waste issues, is a part of the U.S. Department of Health and Human Services. ATSDR was created by the Superfund law and formally organized in 1985. It is responsible for carrying out public health activities associated with actual or potential exposure to hazardous substances released into the environment (ATSDR, 1993b). The agency is responsible for preventing or reducing the harmful effects of exposure to hazardous substances on human health and quality of life. ATSDR is advisory to EPA, federal and state agencies, and community members on the health impacts of Superfund sites. ATSDR conducts the following activities:

- # Evaluates data and information on the release of hazardous substances in the environment at a site.
- # Recommends actions to safeguard health and welfare of exposed individuals.
- # Conducts studies at or near Superfund sites to determine if residents' health has been affected by exposure to a

- hazardous substance.
- # Funds research for study of links between exposure to hazardous substances and disease occurrences.
- # Conducts studies on hazardous substances.
- # Provides technical support and advice at emergency sites and monitors progress of cleanup.
- # Educates professionals and communities on health effects of hazardous substances and how to lessen their exposures to these substances (ATSDR, 1996).

The EPA functions as a regulatory agency to implement the Federal laws designed to promote public health by protecting the nation's air, water, and soil resources from harmful pollution. Through the EPA's mission to protect human health and to safeguard the natural environment, it strives to ensure:

- All Americans are protected from significant risks to human health and the environment where they live, learn, and work.
- National efforts to reduce environmental risk are based on the best available scientific information.
- Environmental protection is an integral consideration in U.S. policies concerning natural resources, human health, economic growth, energy, transportation, agriculture, industry, and international trade, and that these factors are similarly considered in establishing environmental policy.
- Federal laws protecting human health and the environment are enforced fairly and effectively.

Under these functioning guidelines is the Toxics Release Inventory (TRI). As a result of the 1990 Pollution Prevention Act, manufacturing facilities are required to submit to the EPA through the TRI an annual report of toxic chemicals released into the environment. See Appendix C for reporting guidelines and Appendix D for the required data. Based on TRI State Fact Sheets for the MDR states, there are 15 chemicals listed as the major substances released.

According to the TRI (EPA, 1995b), more than 23,000 facilities nationwide released more than 2.8 billion pounds of toxic chemicals. The distribution of toxic releases are as follows: air 59.5%, underground injection 20.5%, land 10.3%, and surface water 9.7%. Of the total 2.8 billion pounds released, the total for the MDR states was 980 million pounds (34% of the national release). See Table 5a for the total amount of toxic releases by the MDR states.

Tables 5a thru 5c show that the area carries a heavy burden of chemicals and wastes that represent potential exposure risks. Several states have total releases for 1996 that are much less than those reported for 1993 (Table 5a). Chemicals and wastes vary in risk carried according to the substance and its toxicity, its concentration, and its route to individuals and populations at a particular community site. For example, not all chemicals are equally toxic. The number of pounds released gives a broad picture of potentially hazardous situations, but the number of pounds fails to specify the degree of hazardous risks to the geographic area and its people. This is the type of information (Table 5a) that appears in the popular press when the TRI reports are published by EPA

each year. Because chemicals vary greatly in their intrinsic toxicity and persistence in the environment, total pounds released do not tell a nurse or a community which releases are most likely to pose the greatest risk to human health. To help identify the most serious health risks, the Environmental Defense Fund (EDF) has developed an Internet scoring system. This scoring system adjusts the amount released to account for differences in toxicity and potential for exposure. Some chemicals are much more toxic than others. Some chemicals degrade in the environment very quickly while others persist for a long time. To allow comparisons on a common scale, the cancer risk scores are reported as “pounds of benzene-equivalents.” To use the scoring system’s scorecard, it will be helpful to understand the use of benzene equivalents. If a facility releases an amount of a chemical that is scored as 10,000 pounds of benzene-equivalents, EDF estimates that it poses approximately the same cancer risk as a release to the air of 10,000 pounds of benzene. Non-cancer risk scores use “pounds of toluene equivalents.”

The Scorecard currently contains only two types of environmental data: (a) chemical pollutants released from manufacturing plants that were required to report to the EPA's TRI and (b) animal waste from factory farms. Table 5b shows that the ranking of the states changes some if these equivalents are used to rank states by the cancer risk scores of the TRI releases. Table 5c shows dramatic shifts if non-cancer risk scores are used to rank states. (More details are on the Internet at: <http://www.scorecard.org/>).

TABLE 5a

1993 & 1996 MDR State Total Toxic Releases

1996 National Rank	State	Total Pounds of Toxic Releases in 1993 ¹	Total Pounds of Toxic Releases in 1996 ²
2	Louisiana	450,680,961	182,105,743
4	Illinois	100,990,919	96,917,534
5	Tennessee	188,207,643	94,876,703
14	Missouri	49,608,818	55,541,256
16	Mississippi	118,019,466	52,785,985
21	Kentucky	36,826,199	41,385,192
22	Arkansas	37,077,881	32,498,127
Total	MDR	981,411,887	556,110,540

Sources: ¹EPA 1993 TRI data ² EPA 1996 TRI data**TABLE 5b**

1996 MDR State Rankings by Cancer Risk Scores

State	National Cancer Risk Rank	Cancer risk score in pounds of benzene equivalents ¹
Louisiana	2	110,000,000
Illinois	13	14,000,000
Tennessee	18	7,300,000
Missouri	12	14,000,000
Mississippi	21	7,000,000
Kentucky	19	7,200,000
Arkansas	15	11,000,000

Source: ¹ EDF Scorecard

Table 5c

1996 MDR State Rankings by Non-cancer Risk Scores

State	National Non-cancer Risk Rank	Non-cancer risk score in pounds of toluene equivalents ¹
Louisiana	19	83,000,000,000
Illinois	4	460,000,000,000
Tennessee	20	74,000,000,000
Missouri	2	810,000,000,000
Mississippi	32	22,000,000,000
Kentucky	16	87,000,000,000
Arkansas	23	63,000,000,000

Source: ¹ EDF Scorecard

According to the information gathered by the LMDC (1990), most of the nation's hazardous waste is generated by the chemical industry. Waste management has become an important issue for the nation as well as for the MDR. A growing concern is that the availability of disposal sites is rapidly decreasing. States that were once able to handle their waste plus the waste transferred from other states are no longer able to do so. Some sites are full and others have been closed for violating federal and state regulations. Past practices of waste management were not always environmentally safe, thus air quality suffered. Because landfills were not properly prepared, ground and surface waters were polluted. Millions of people living near hazardous waste sites are at risk for a variety of diseases. As a result of improper management, the environment, natural resources, and the welfare of residents,

have been jeopardized.

To address national concerns about hazardous exposures, Congress established the Superfund Program in 1980 to clean up hazardous waste sites. This program involves the EPA and ATSDR. The Superfund program is administered by the U.S. Environmental Protection Agency (EPA), in cooperation with individual state governments. The Superfund Trust Fund provides the fiscal resources needed to locate, investigate, and clean up hazardous waste sites throughout the United States. The funds are generated from taxes on the chemical and petroleum industries. This supports the notion stated in the *Mississippi Delta Project Health and Environment Prospectus* (1995), that federal and state governments should require new and existing industries to bear the cost of negative environmental impacts that are created through

industrial operations.

There have been approximately 642 hazardous waste sites and 114 National Priorities List Superfund sites identified in the MDR.

		NPL Sites	Other Waste Sites
#	Arkansas	10	13
#	Illinois	39	64
#	Kentucky	17	26
#	Louisiana	11	unreported
#	Mississippi	03	200
#	Missouri	21	84
#	Tennessee	13	255

Learning Activity

Use the Environmental Defense Fund's (EDF) "Scorecard" on the Internet (see Appendix F) and the worksheets in Appendix G to answer these questions:

What chemical has the highest cancer risk score in the EDF Scorecard for your county?

What facility has the highest cancer risk score in the EDF Scorecard for your county?

What chemical has the highest non-cancer risk score in the EDF Scorecard for your county?

What facility has the highest non-cancer risk score in the EDF Scorecard for your county?

Using the lists in Module III, what are the potential health risks associated with the chemicals you identified?

What three actions could you take to prevent

health risks for individuals, families, and your community from the chemicals from the factories you identified?

++Contact one of the facilities you identified above to determine if there is an Occupational Health Nurse employed by the facility. Arrange with your instructor for a field experience with the nurse. What is the nurse's role in preventing chemical exposures to the worker? What are the potential health risks that the Occupational Health Nurse has identified for her clients?

++Arrange with your instructor for a field experience with your local or state department of health's division of environmental services. What is their emergency response plan for unplanned chemical releases of these chemicals into the atmosphere? How do they work with a facility to protect the health of the public? Locate the Superfund sites in your state and identify the hazardous chemicals involved.

++Survey industrial plants located in your community and determine how they dispose of wastes. Identify actual or potential health risks of these wastes.

5.3 Identify adverse human health and environmental effects of major chemicals released in the MDR

Environmental health risks specific to the MDR are related to major chemicals released there (see Table 6). These chemicals exhibit a variety of adverse effects for health and the environment (EPA, 1995c). As discussed above and in Module III, whether or not chemicals affect people's health depends on the duration and dose of the exposure as well as the individual's own susceptibility.

To assist in focusing strategies for environmental health studies and surveillance activities at hazardous waste and National Priorities List sites, ATSDR (1993a) developed the following list of seven Priority Health Conditions (PHCs).

Birth defects and reproductive disorders: The male and female reproductive systems and developing fetus are known to be sensitive to the effects of biological, physical, and chemical agents. Exposure to environmental toxicants can result in a variety of adverse reproductive outcomes.

Cancer (Selected Anatomic Sites): When body cells reproduce and result in uncontrolled growth, they can progress to malignancy or cancer. Many different types of cells

and body organs can be affected by a wide variety of environmental toxicants, resulting in different types of cancer. Various hazardous substances have been associated with human cancer.

Immune function disorders: The immune system identifies foreign substances and provides a host defense mechanism against these substances. Disorders of the immune system can be helpful in identifying exposure and early disease states.

TABLE 6

Leading Chemicals Released by the Mississippi Delta Region (MDR) States in Pounds

Chemical Substances	MDR States Reporting	State Composite Totals
1. Ammonia	AR, TN, IL, MS, LA	100,118,484
2. Methanol	LA, MS, KY, TN	40,393,209
3. Toluene	AR, TN, IL, KY, MS, MO	39,779,788
4. Hydrochloric acid	MS, IL, TN, AR	132,560,155
5. Acetone	AR, TN, KY	32,044,700
6. Xylene/mixed isomers	MO, KY, TN, AR	19,540,910
7. Zinc compounds	MO, IL	14,723,582
8. Zinc/fume or dust	MO	4,024,829
9. Manganese compound.	IL	5,235,423

10.	Methyl ethyl ketone	MO, MS	7,480,538
11.	Dichloromethane	MS	5,489,153
12.	Sulfuric acid	MS, LA	117,904,403
13.	Phosphoric acid	LA	176,923,184
14.	Carbon disulfide	LA, TN	36,894,405
15.	Glycol ethers	KY	1,281,972

Source: U.S. Environmental Protection Agency 1993 Toxic Release Inventory

chemically modified and used by other cells in the body. Environmental toxicants have been associated with hepatic necrosis, lipid accumulation, cholestasis, cirrhosis and fibrosis, and chemically induced hepatitis.

Lung and respiratory diseases: The major function of the lung is the exchange of oxygen and carbon dioxide. Environmental toxicants that enter the respiratory system have been associated with irritation, necrosis and edema, fibrosis, allergic responses, and primary lung tumors.

Neurotoxic disorders: The nervous system coordinates and regulates vital body functions. Neurotoxic effects may result in structural or functional alterations in portions of the central and/or peripheral nervous system.

Individual body system responses are further detailed in Modules III and IV. Table 7 shows types of health effects caused by environmental contaminants. These effects may be general or specific. Effects on the public's health are quite complex and usually interconnected. Nuclear power plant emissions can contaminate both water and air simultaneously impacting water quality, atmospheric quality, and radiation risk (Swanson & Albrecht, 1993).

The environmental health challenges of the MDR are represented similarly throughout the United States. Analysis of the problems and nursing interventions are described in the following curriculum modules that follow. Lessons learned in MDR examples may be applied to other national regions. At present, when industries release more waste than allowed into bodies of water or the atmosphere they are fined.

Learning Activity

Use Table 7 to answer these questions:

Which two types of health effects are identified with the most chemicals listed?

How many of the listed chemicals have 3 or more health effects? What are the names of these chemicals? Locate one of them in the lists in Module III. Name one specific health effect for the associated health effect categories (e.g. Carbon monoxide can have neurotoxic health effects such as headache, confusion, seizures, etc.)

Discuss the case study found in Appendix E and answer the critical questions. What actions can be taken by citizens and by nurses? Identify elements of an exposure pathway from the case study.

Teaching Methods

The objectives of the module can be achieved through lecture, small group discussion, assigned readings, field experiences, and other creative strategies. Learning activities and a case study (Appendix E) have been included to facilitate relevant application of the module's content to the student's community.

Evaluation

Standards for satisfactory attainment of the objectives may be evaluated through examination, verbal questioning, and evaluation of written assignments.

TABLE 7

Types of Health Effects caused by Environmental Contaminants

Chemicals	Types of Health Effects (ATSDR Priority Health Conditions)						
	Birth Defects	Cancer	Immune Function	Kidney Function	Liver Function	Lung & Resp.	Neuro-toxicity
Ammonia ^{1*}				x		x	x
Arsenic ¹	x	x	x	x	x		
Asbestos ¹		x	x			x	x
Benzene ¹	x	x	x				x
Carbon Monoxide ²							x
Carbon Disulfide ^{1*}	x						x
Chlordane ¹	x						x
Dioxins ³	x	x	x		x		
Glycol Ethers ^{2*}	x						x
Lead ¹	x		x	x			

Methyl Mercury ¹			x	x			
Nitrate/ Nitrite ⁴	x						
Ozone ¹						x	
Organo- phosphate Insecticides ¹							x
Polychlorinated Biphenyls (PCBs) ¹	x				x		
Sulfuric Acid ^{1*}						x	
Toluene ^{1*}							x
Trichlor- ethylene ¹	x			x	x		x

Source: ¹ATSDR 1993a; ² LaDou 1990; ³ ATSDR 1997; ⁴ ATSDR 1991 * Denotes leading chemicals released in MDR states.

References

Agency for Toxic Substance and Disease Registry (ATSDR) (1991). Case studies in environmental medicine: nitrate/nitrite toxicity, Atlanta, GA: U.S. Department of Health & Human Services, Public Health Service.

ATSDR (1992). Case studies in environmental medicine: taking an exposure history, Atlanta, GA: U.S. Department of Health & Human Services, Public Health Service.

ATSDR (1993a). Priority health conditions, Atlanta, GA: U.S. Dept. Of Health & Human Services, Public Health Service.

ATSDR (1993b). Public health assessment guidance manual, Ann Arbor, MI: Lewis Publishers.

ATSDR (1994). Hazardous substances and public health, Atlanta, GA: U.S. Department of

Health & Human Services, Public Health Service.

ATSDR (1996). About ATSDR. (Pamphlet) Atlanta, GA: U.S. Department of Health & Human Services, Public Health Service.

ATSDR (1997). Toxicological profile for chlorinated dibenzo-p-dioxins, Atlanta, GA: U.S. Department of Health & Human Services, Public Health Service.

Arkansas State Profile (1997). Arkansas as a business location. [on-line]. Available: <http://www.aedc.state.ar.us/arkansas/arkansas-main.html>

Bureau of Labor Statistics (1997). Local Unemployment Statistics. [on-line]. Available: <http://stats.bls.gov/blshome.html>

Cobb, J.C. (1992). The most southern place on earth. New York: Oxford University Press.

Demers, R. (1990). Case studies in environmental medicine. (ATSDR) Atlanta, GA: U.S. Department of Health & Human Services, Public Health Service.

Dunbar, T. (1990). Delta time: A journey through Mississippi. New York, Pantheon.

Environmental Defense Fund (1998). Scorecard. [on line] Available: <http://www.scorecard.org/>

Environmental Protection Agency (EPA) (1995a) 1993 Toxic release inventory: Public data release. EPA 745-R-95-010.

EPA (1995b) 1993 Toxic release inventory: Public data release- Executive Summary, EPA 745-S-95-001.

EPA (1995c) 1993 Toxic release inventory: Public data release- State fact sheets, EPA 745-F-95-002.

EPA (1997). Envirofacts Warehouse Homepage. [on-line] Available: <http://www.epa.gov/enviro>

Gray, R. (1996). Negotiating differences: Southern culture(s) now. In R.H. King & H. Taylor. (Eds.) Dixie debates: Perspectives on southern cultures. (pp.218-227) Washington Square, NY: New York University Press.

Joyner, C. (1996). African and European roots of Southern culture: The 'Central theme' revisited. In R. H. King & H. Taylor (Eds.), Dixie debates: Perspectives on southern cultures. (pp. 12-30), Washington Square, NY: New York University Press.

Kentucky Atlas and Gazetteer (1997). Industrial mineral facts. [on-line]. Available:

<http://www.uky.edu/KGS/coal/webindmn/combo.htm>

Knuckles, M.E., Hubbard, M., and Fitzgerald, C. (1997) in consultation with Knowles, D.A. Mississippi Delta Project: Health and environment. Educational resources supplement. Unpublished manuscript, Nashville, TN. Meharry Medical College, Division of Environmental Health.

Knuckles, M.E., Hubbard, M., Hunter, G., & Jackson, C.W. (1998). Mississippi Delta Project: Health and environment. Health provider profile. Unpublished manuscript, Nashville, TN: Meharry Medical College, Division of Preventive Medicine.

LaDou, J. (1997) Occupational and Environmental Medicine. Stamford, CT: Appleton & Lange.

Levine, R., Epelbaum, M., Nelson-Knuckles, B., Meltzer, A., Pellet, H., & Knuckles, M.E. (1997a). Preliminary mortality and morbidity profile of the Mississippi Delta Region. Unpublished manuscript, Nashville, TN: Meharry Medical College, Division of Preventive Medicine.

Lincoln, C.E., & Mamiya, L.H. (1990). The Black church in the African American Experience. Durham, N.C.: Duke University Press.

Louisiana Dept. of Economic Development (1994). Louisiana industry [on-line]. Available: <http://www.crt.state.la.us/crt/profiles/industry.htm>

Lower Mississippi Delta Commission Final Report (1990) The Delta initiatives: Realizing

the dream...fulfilling the potential, Final report of the LMDC. Joint hearing before the Subcommittee on Economic Development of the Commission on Public Works and Transportation and the Subcommittee on Economic Stabilization of the Committee on Banking, Finance and Urban Affairs. House of Representatives, 101 Congress, Second Session, May 16, 1990.

Lower Mississippi Delta Commission Interim Report (1989) The Body of the nation, Washington, D.C.: U.S. Government Printing Office.

Mississippi Delta Project: Health and environment prospectus, (1995), Atlanta, GA: U.S. Department of Health & Human Services, Public Health Service.

Mississippi Department of Environmental Quality (1992). Non-point source: Problems and solutions. Office of Pollution and Control, Water Quality Management Branch.

Nathan, V.R., Gatebuke, J., & Knuckles, M.E. (1997). Mississippi Delta Project: Health and environment. Unpublished manuscript, Nashville, TN: Meharry Medical College Division of Environmental Health.

National Association of County Health Officials (NACHO) (1994). Blueprint for a healthy community: A guide for local health departments. Centers for Disease Control and Prevention (#U5Gccu302718-07).

Nelson-Knuckles, B., Epelbaum, M., Knuckles, M. E., & Hubbard, M. (1997). Mississippi Delta project: Health and environment. Unpublished manuscript, Nashville, TN. Meharry Medical College, Division of Environmental Health.

Pope, A.M., Synder, M.A., Mood, L.H. (Eds.) (1995). Nursing, health & the environment. Washington, DC: National Academy Press.

Prevos, A. J. M. (1989). Review of book. Sacre, R. (1987). The voice of the Delta - Charley Patton and The Mississippi blues: Traditions, influence, and comparisons in Black Perspectives in Music, 17, 185-189.

Reed, J.C. (1993). My tears spoiled my aim and other reflections on southern culture. Columbia, Missouri: University of Missouri Press.

Swanson, J.M. & Albrecht, M.A.. (1993). Community health nursing: Promoting the health of aggregates. W.B. Saunders: Philadelphia.

Swanson, J.M. & Niles, M.A.(1997). Community health nursing: Promoting the health of aggregates. W.B. Saunders: Philadelphia.

U.S. Census Bureau (1993). County income and poverty estimates. [Online] Available: <http://www.census.gov/hhes/www/saipe/stcty/estimate.html>

From this site the user selects the following from three lists showing:

- › Income Year: 1993
- › State
- › Statistic: Median household income; % poverty

Press the “Get Table” button.

This will generate the following data page: <http://www.census.gov/cgi-bin/hhes/saipe93/gettable.pl>

U.S. Census Bureau (1996). Current population surveys. [on-line]. Available: <http://www.census.gov>

U.S. Department of Commerce (1996).
National Center for Education Statistics
Common Core of Data, Universe Collection
(Unpublished data).

Walton, A. (1996). Mississippi: An American journey - New York: Alfred A. Knopf.

Worldmark encyclopedia of the states (1995).
Detroit: Gale Research.

Yates, G.G. (1990). Mississippi mind: A personal cultural history of an American state.
Knoxville, TN: Univ. of Tennessee Press.

Appendix A: Lower Mississippi Delta Counties and Parishes

(Source: Mississippi Delta Project: Health and Environment Prospectus)

LOWER MISSISSIPPI DELTA COUNTIES AND PARISHES

Arkansas	Illinois	Kentucky	Louisiana	Mississippi	Missouri	Tennessee
Arkansas	Alexander	Ballard	Acadia	Adams	Bollinger	Benson
Ashley	Franklin	Caldwell	Allen	Amite	Butler	Carroll
Baxter	Gallatin	Calloway	Ascension	Artala	Cape Girardeau	Chester
Bradley	Hamilton	Carlisle	Assumption	Benton	Carter	Crockett
Calhoun	Hardin	Christian	Avoyelles	Bolivar	Crawford	Decatur
Chicot	Jackson	Crittenden	Caldwell	Carroll	Dent	Dyer
Clay	Johnson	Fulton	Catahoula	Claiborne	Douglas	Fayette
Cleveland	Massac	Graves	Concordia	Coahoma	Dunkin	Gibson
Craighead	Perry	Henderson	East Baton	Copiah	Howell	Hardeman
Crittenden	Pope	Hickman	East Carroll	Covington	Iron	Hardin
Cross	Pulaski	Hopkins	East Felicia	DeSoto	Madison	Haywood
Dallas	Randolph	Livingston	Evangeline	Franklin	Mississippi	Henderson
Desha	Saline	Lyon	Franklin	Grenada	New Madrid	Henry
Drew	Union	Marshall	Grant	Hinds	Oregon	Lake
Fulton	White	McCracken	Iberia	Holmes	Ozark	Lauderdale
Grant	Williamson	McLean	Jackson	Humphreys	Pemiscot	McNairy
Greene		Muhlenberg	Jefferson	Issaquena	Perry	Madison
Independence	16 Counties	Todd	Lafourche	Jefferson	Phelps	Obion
Izard		Trigg	LaSalle	Jefferson	Reynolds	Shelby
Jackson		Union	Lincoln	Lafayette	Ripley	Tipton
Jefferson		Webster	Livingston	Lawrence	St. Genevieve	Weakley
Lawrence			Madison	Leflore	St. Francis	
Lee		21 Counties	Morehouse	Lincoln	Scott	21 Counties
Lincoln			Orleans	Madison	Shannon	
Lonoke			Ouachita	Marion	Stoddard	
Marion			Pointe	Marshall	Texas	
Mississippi			Plaquemines	Montgomery	Washington	

Monroe	Rapides	Panola	Wayne
Ouachita	Richland	Pike	Wright
Philips	St. Bernard	Quitman	
Poinsett	St. Charles	Rankin	29 Counties
Prairie	St. Helena	Sharkey	
Pulaski	St. James	Simpson	
Randolph	St. John the	Sunflower	
St. Francois	St. Landry	Tallahatchie	
Searcy	St. Martin	Tate	
Sharp	St. Tammany	Tippah	
Stpone	Tangipahoe	Tunica	
Union	Tensas	Union	
Van Buren	Union	Walthall	
White	Washington	Warren	
Woodruff	West Baton	Washington	
	West Carroll	Wilnkinson	
	West Felicia	Yalobusha	
	Winn	Yazoo	
42 Counties	45 Counties	45 Counties	

Appendix B: Instructions for Locating Information on the Environment from US Environmental Protection Agency (EPA) Internet Site

The EPA maintains an Internet site, <http://www.epa.gov>, which includes information on its mission to protect human health and to safeguard the natural environment; its activities, projects and policies; and various searches than an Internet user may execute by following directions at the site. Environmental information may be obtained through a zip code search. Three geographic databases that are especially useful to community residents and health care workers are as follows:

Envirofacts: Pollution, hazardous waste sites, and other regulatory information.

Maps on Demand: Computer-generated maps of regulated sites by geographic areas

Surf Your Watershed: Environmental conditions and activities in watershed areas.

Through EPA Zip Code Search on the Internet one can get information on superfund sites, drinking water, air pollution, toxic releases, hazardous waste, and water discharge permits. Available also is a map of specified neighborhoods, which will include particular environmental information the user selects. The nurse or citizen investigator can locate a specific watershed and learn of its condition and vulnerability.

Format for the Internet pages is updated annually or more frequently. Searching for information allows branching from one type of information to another; there are several routes to the various query forms that allow the user to specify the geographic area and information sought. The following routing is described for a beginner user of the EPA information system. It covers only part of the information available about a geographic area. Since information is reformatted from time to time the exact sequence of steps as described here may change, however the site location and types of information available remain consistent. Instructions for utilization are included at the EPA Internet site and will be updated whenever format changes.

Steps for using the EPA Internet through Zip Code Search are:

Enter the following Internet address: <http://www.epa.gov>

Select and click "Search by Zip Code."

On the zip code search page that is displayed, type the five figure zip for the area you wish to explore. Select "Envirofacts" or "Surf Your Watershed." Click Submit.

The selection, "Envirofacts" or "Surf Your Watershed," brings up "Envirofacts Query results"

Industrial facilities are listed.

Click on any facility name for details about it.

Click on additional information for extensive details.

The selection, "Surf Your Watershed," (again accessed through the Zip Code Search Page), brings up this choice.

The user selects particular bodies of water in the selected zip code area.

Click on the one for which you are exploring for details.

Click for information on water, land, people, and air for choices.

Through “Maps on Demand,” the user can request a computer-generated area map to include specific types of information such as roads, waterways, population density, superfund sites, industrial facilities, and schools. Once the user selects the map specifics and checks these to request a map, the computer program requires several hours for processing. The user types in his or her email address; a computer notification will be sent to that email address as soon as the map is ready for viewing or printing.

Mapping allows one to better understand spatial interrelationships between natural resources, possible pollution sources, and populations.

Appendix C: EPA Guidelines for Reporting Toxic Chemical Releases

Any manufacturing facility that meets the following guidelines is mandated to report chemical releases to the EPA:

- a. conducted manufacturing operations for products with Standard Industrial Classification (SIC) codes 20-39 (see Table below);
- b. had 10 or more full-time employees; and
- c. manufactured or processed more than 25,000 pounds or used more than 10,000 pounds of any listed chemical during a calendar year.

Standard Industrial Classification (SIC) Codes 20-39

SIC Code	Industrial Product	SIC Code	Industrial Product
20	Food products	30	Rubber & elastic products
21	Tobacco products	31	Leather products
22	Textile	32	Stone, clay, glass, concrete
23	Fabrics/Apparel	33	Primary metals
24	Lumber and wood products	34	Fabricated metals
25	Furniture and fixtures	35	Machine & Computer equip
26	Paper products	36	Electrical equipment
27	Printing and publishing	37	Transportation equipment
28	Chemical & allied products	38	Instruments (measuring)
29	Petroleum/Coal refining	39	Miscellaneous

Note: Industries with SIC codes between 20-39 must submit Toxic Release Information to the Environmental Protection Agency. Source: EPA 1993 TRI Executive Summary

Appendix D: Toxics Release Information (TRI) Required for Submission to EPA Annually for TRI data

Required information includes:

- a. Amount of each listed chemical released to the environment at the facility
- b. Amount of each chemical shipped from the facility to other locations for recycling, energy recovery, treatment or disposal
- c. Amount of each chemical recycled, burned for energy recovery, or treated at the facility
- d. Maximum amount of the chemical present on-site at the facility during the year
- e. Types of activities conducted at the facility involving the toxic chemical
- f. Source of reduction activities undertaken to prevent pollution and waste generation
- h. Environmental permits held by the facility
- i. Name and telephone number of a person to contact at the facility for more information.

Appendix E: Case Study on Waste Water Problems

In 1987 a large metropolitan city located in the MDR of the southeastern portion of the United States was faced with a serious waste water treatment situation. This city had a consolidated sewer district, consisting of three treatment plants and an interconnecting sewer system. For years the city had experienced street flooding, drainage overflows, and sewage backups during severe storms. Under normal circumstances, once waste water was treated using waste-eating microorganisms to remove pollutants from the water, the water was allowed to empty into the Mississippi River. However, due to the age of the sewer system, sewer gases had caused cracks in the system, which allowed ground water from heavy rains to seep in causing an overload in the already stressed sewer system. In addition to the ground water entering the system, foul odor had escaped through the cracks, which not only annoyed residents near the treatment plants but also posed potential health threats. Drainage from the city's sewer system created problems not only for the city's residents, but also for the environmentally sensitive areas of the Mississippi River and its adjacent rivers. Because of the economic impact of the Mississippi River on its bordering communities, the emptying of raw or improperly treated waste water into the Mississippi River creates numerous concerns. The United States EPA ordered the city to comply with a mandate for upgrading the collection and treatment system to meet the federal Clean Water Act regulations or be fined.

1. If the city fails to upgrade the collection and treatment system what actions can citizens take?
2. What can nurses do to assist citizens in this case?

Appendix F: Instructions for Locating Information on the Environmental Defense Fund’s “Scorecard” site on the Internet.

1. Enter the Internet address: <http://www.scorecard.org/>
2. Bookmark the address so you can find it quickly in the future.
3. Scroll to the bottom of the page and click on “Site Navigation.”
4. Click on “Pollution Rankings.”
5. Click on “Counties.”
6. For “Ranked by,” select “Cancer Risk Score.”
7. In: your state (or one you want to explore).
8. Click on “GO.”
9. Write the name of the top ranking county (cities) and pounds of benzene-equivalents in the first two columns of the cancer risk worksheet.
10. Click on the top ranked county.
11. Click on “(Year) TRI Pollution Releases Ranked by Potential Human Health Risks.”
12. Click on the chemical listed as the “Top Ranked Cancer Risk” for the county you selected.
13. Write the name of the chemical and its pounds of benzene-equivalents in the third and fourth columns of the worksheet.
14. Click on “See a list of facilities.”
15. Write facility name(s) and pounds of benzene-equivalents in the last two columns of the worksheet.

Do the same for “NonCancer Risk Score” and record the data in the second worksheet.

Appendix G: Worksheet for using the EDF Scorecard

Top cancer risk scores from industrial discharges in communities

County/State	Pounds of Benzene-equivalents	Top Ranked Cancer Risk Chemical	Pounds of Benzene-equivalents of top-ranked chemical	Facilities with top cancer risk scores	Pounds of Benzene-equivalents discharged by facility

Top non-cancer risk scores from industrial discharges in communities

County/State	Pounds of Toluene-equivalents	Top Ranked Non-Cancer Risk Chemical	Pounds of Toluene-equivalents of top-ranked chemical	Facilities with top non-cancer risk scores	Pounds of Toluene-equivalents discharged by facility



Small Area Income and Poverty Estimates

Tables for States and Counties by Income Year and Statistic

NOTES: (1) "National" provides estimates for the nation and each state;
any state provides estimates for the state and each of its counties.
(2) For the statistic "people under 5 in poverty", choose NATIONAL.

Income Year	State	Statistic

After you have made your selections, then or

Return to [State and County Estimates](#)

Source: U.S. Census Bureau

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